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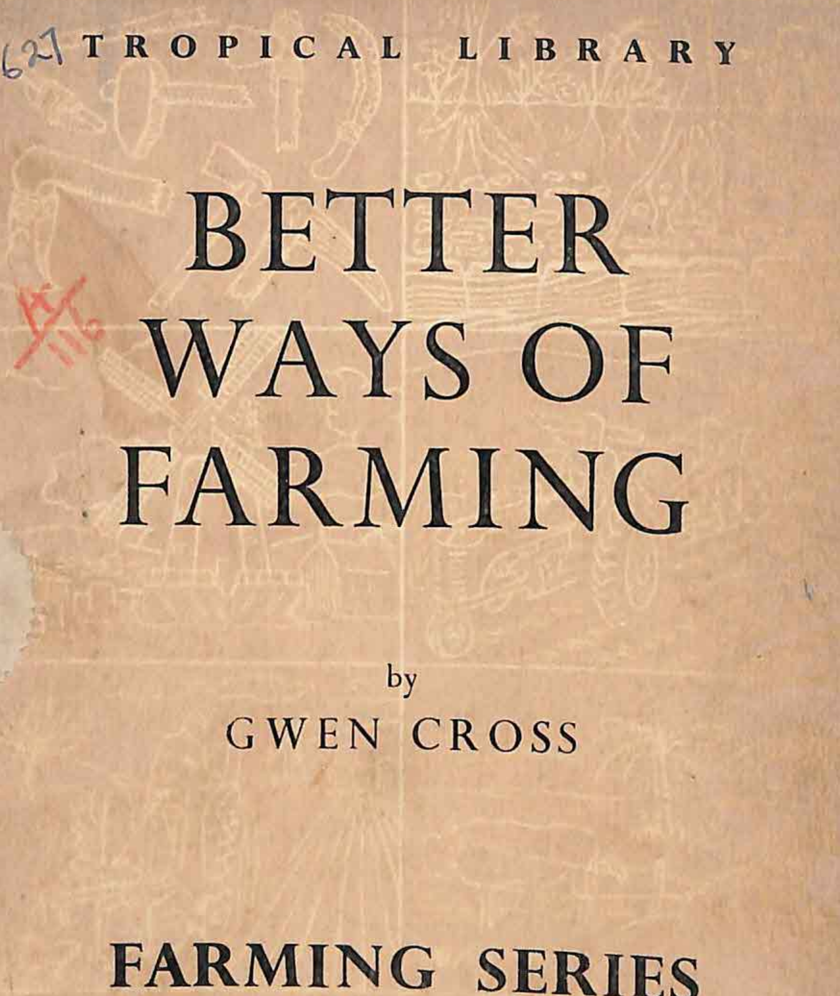

BETTER WAYS OF FARMING

by

GWEN CROSS

FARMING SERIES

BOOK FOUR

LONGMANS

soil. All this decaying matter has turned into humus.

The big trees have taken much food from the soil, but they have put back into the soil more food than they took from it. They themselves have made food when the sunlight has allowed their leaves to take carbon from the air. This extra food has been in the trees when they rotted and turned into humus. The humus has made the soil warm, damp and porous, and millions and millions of microbes have been able to live and multiply there. These microbes have lived on rotting plants and animals, turning them into humus and making plant food.

The leaves on the trees have shaded the soil from the hot sun. When they have fallen, they have made a thick cover on the ground. They have kept the soil from drying and cracking. They have kept the sun from burning up the humus or killing the microbes.

The big, branching roots of the trees have made "stops" in the soil, so that the rain could not wash it away. The small roots have made little paths in the soil. Air and water have gone down into the soil by these paths, and have helped to change the stored food into plant food.

Where man has not dug the soil, the rain and the sun have helped to make it richer and better. They do not damage the soil where trees and grasses and other plants are left to grow in their own way. The plants keep on growing, and the soil does not get hungry. Each year it becomes better than it was before. We know this, for we get good harvests when we plant crops on newly cleared land. The crops will not grow in the shade of the trees, so we have to cut the trees down before we can make a garden.

QUESTIONS

1. Write down the new words in this lesson and learn them.
2. How do the trees help to feed the soil?
3. How do the trees help to shade the soil from the sun?
4. How can the sun damage the soil?
5. How do the roots of the trees protect the soil from damage by rain-water?
6. How do the roots help to make plant food in the soil?
7. Why do we get good crops from newly cleared forest land? Why must the trees be cut down?
8. In what part of the soil do the microbes live?
9. How do the microbes help the soil?

CHAPTER 2

HOW MEN CHANGED THE SOIL

THE first men collected what food they could find in the bush. They did not make gardens, but moved about from place to place seeking their food. The food they got was often poor and they were sometimes hungry.

Later, as we have read, men planted gardens

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.T, W.S. ABBAS.

PART 1.

THE OLD AND THE LATER WAYS OF FARMING

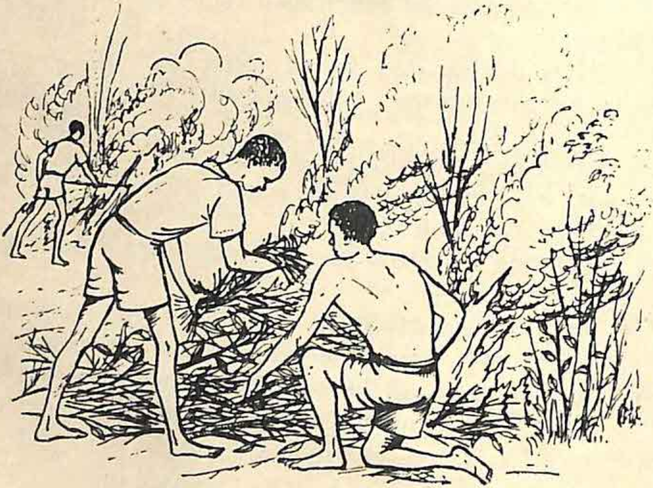
CHAPTER 1

HOW THE TREES HAVE HELPED THE SOIL

IN many tropical countries most of the land is covered with trees. The trees grow close together, and many are very tall with wide-spreading branches. Creepers climb over them and stretch from tree to tree. Some of the trees may be more than a thousand years old. Others are not so old, but have been growing for many years and will go on growing for many more years. When they die other trees will take their place.

Every year the trees grow taller. Branches break and fall. Leaves, flowers and fruits die, fall, and rot on the soil. At last the trees themselves die, fall and slowly rot away. But new trees have grown from seed to take their places.

In the places where trees cannot grow, there is often tall grass. Every year the grass has lived, died, fallen and rotted. Every year new grass has grown. Year after year grass, trees, and parts of trees have rotted on the soil. Animals and insects have died and their bodies also have rotted on the and built houses and villages. When they first began to do this, there were not many people and there was much land for each of them. The people had few tools, so they could cut down only the small trees. They burnt the big trees, stems, branches and leaves. Then they planted their crops.



BURNING RUBBISH
Do good farmers do this?

In the first year the soil was very good. Some humus was destroyed when the trees were burnt, but some still remained. The ash from the burnt trees gave potash to the soil and the plants grew well, so that harvests were good. The people gathered the harvests and burnt the unwanted parts of the plants. They planted food again in the same place, but the second crop was not as good as the first one had been. Each crop taken from that piece of land was poorer than the one before.

Men were doing damage to the soil because:

1. Where the gardens were, there were now no trees to feed the soil with their dead branches, leaves, flowers and fruits. Men burnt these or threw them away at the side of the garden. They did not leave them to rot and feed the soil. A big tree rots slowly and gives back food to the soil for a number of years. When it is burnt it leaves only a little ash, which is soon used up by the plants or washed away by the rain.

2. Many small trees and branches of big ones were cut up for firewood and carried to the villages. They were not left to rot on the ground and give back food to the soil.

3. There were no big trees to shade the soil with their leaves. There was no cover of dead leaves on the soil. Between crops and when the new crops were young, the hot sun burnt the soil, harming the microbes and damaging the humus. Rain-water flowed over the bare ground and washed away the good top soil.

4. There were no growing roots, big and small, to open up the deeper soil to the air and water. The roots of the crops took their food from the top layers, and more and more store food from this part of the soil was changed to plant food, which was used by the plants or damaged by sun and rain.

5. Weeds grew between the plants and took from the soil the foods the crops needed. The

weeds were pulled up and burnt, or thrown away at the side of the garden.

In these ways men brought changes and harmed the soil. The fertile top-soil, which had been made slowly through thousands of years, became poor in a few years. Each year the soil grew more hungry and the crops became smaller.

QUESTIONS

1. Write down the new words and learn them.
2. How did the first men get their food?
3. How did the burning of trees and leaves damage the soil?
4. Why were the first year's crops good?
5. Why were the crops poorer every year after the first one?
6. How did the weeds harm the crops?
7. How did the sun and rain damage the soil between crops?
8. What did the soil lose when the trees had been cut down and burnt?

CHAPTER 3

NEW GARDENS AND NEW VILLAGES

IN time the soil became so poor that the people did not get big enough harvests to feed themselves and their children. So they said, "We must find new land for our gardens." First they used up the good land near their villages, then they had to find land farther away from their homes. Every morning they had to walk a long way to their gardens and every evening they carried back heavy loads of food or fire-wood.

Later, even the distant gardens of some villages became poorer, while the land near the villages remained poor. The land where the villagers wished to make their new gardens was too far away for them to walk to it every day, so they had to move their homes. They had to do much work to get the land cleared, first for the new villages and then for the new gardens.

This is what millions of people had to do through hundreds of years in many countries. They grew their food on the land until the soil was worn out. They made new gardens farther and farther away from their village. Then they had to

CLEARING LAND FOR A NEW GARDEN

move the village to a new place where there was good soil on which they could grow their food for a few more years.

QUESTIONS

1. Write down the new words in this chapter and learn them.
2. Why did the people have to find new land far from their village?
3. Why, after a time, did they have to move the village?
4. What is the past tense of burn; take; throw; use?
5. Far and farther:—

Is it far from the school to the church?
Which is farther from your house, the church or the school?

Write sentences like these, showing how to use "far" and "farther".

CHAPTER 4

A BETTER WAY OF FARMING

GARDENS THAT REST; CHANGING CROPS; MIXED CROPS

IN places where there were few people and much land, each man had often several gardens in different parts of the bush. They did not plant them all each year, and the bush began to grow again on the unplanted gardens. Sometimes it was allowed to grow for only one year. Sometimes it grew for several years before the garden was planted again.

During this time dead leaves, stems and branches fell on the soil. They rotted and began to put food back into the soil.

Then the farmer needed this land again. He cut the bush and burnt the trees as he had done before. He planted food crops again. Often they were not as good as they had been after the first clearing, but they were better than in the gardens where crops had been grown each year. The crops in a garden which had rested for several years were better than those in a garden that had rested for only one year.

The farmer noticed that the soil wore out more quickly if he grew the same crop in a garden for several years. He did not know the reason for this, but he saw that, if he could keep on using the same garden for different crops for a few more years, he would not have to clear a new garden so often. He began to change the crops which he grew on a particular garden and to watch the results.

Then perhaps he tried planting two crops on the same garden one year. Perhaps he planted maize with millet or sweet potatoes, or cabbages with beans or tomatoes. If the crops did well he would try again, perhaps on another garden. Other people would see what he had done, and they too would try, perhaps with different crops. In this way they found out which crops helped each other when planted together and which crops were better when planted after each other.

So people slowly found out how long the land where they lived should be rested, which crops should follow one another on the same garden and which crops should be planted together in the same garden.

QUESTIONS

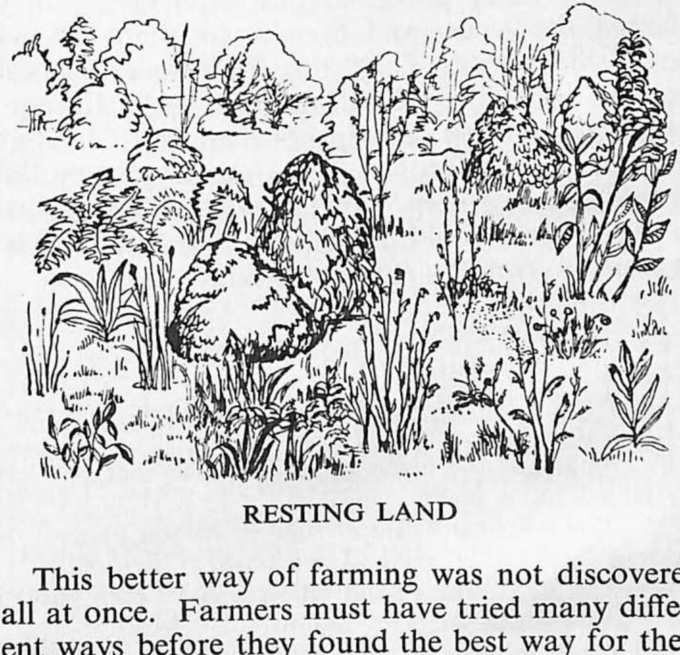
1. Write down the new words in this chapter and learn them.
2. When gardens were left for several years, what happened to them?
3. Why did people begin to change the crops they planted on a garden?
4. What were the three things which people found out to make their work easier and give them better crops?

CHAPTER 5

FALLOW (RESTING) LAND

AFTER many years much bush land in England and other parts of Europe had been cleared. People began to see that it was a waste of time having gardens in different parts of the bush. They saw too that part of a big garden could be rested just as well as a small separate one. So big gardens were made and divided into fields. Each field was separate but close to the others.

In one field the farmers did not plant food. It was left unplanted for one year, and was called fallow, or resting, land. In each of the other fields the farmers planted a different crop. The next year the field which had been resting was planted, and another field was fallow. On each of the planted fields the crop was different from the year before. Each field had one year's rest and then was planted with a different crop each year until its turn came to rest again. In this way the farmers helped their soil and their crops.



RESTING LAND

This better way of farming was not discovered all at once. Farmers must have tried many different ways before they found the best way for their kind of country. What was the best way in one part of the country was perhaps not the best way in another part. The number of years a field could produce good crops without having to be left fallow again had to be found out. The best crops for that part of the country and the best order in which to plant them had to be found out too. Each farmer handed his knowledge down to his son, and the wise ones went on trying to find better ways of farming.

Among other things they found that ploughing and hoeing helped the crops and made them grow better. So they ploughed the fields before they planted the seeds, and then hoed them to get rid of the weeds. They also found out the best way to deal with the fallow fields. In Europe, where the sun and rain do not damage the soil as they do in the Tropics, they could plough the fallow field and keep it free of weeds. To do this in the Tropics would harm the soil and allow it to be carried away by wind and rain.

QUESTIONS

1. Write down the new words in this chapter and learn them.
2. What was the name given to a field that was left unplanted for a year?
3. Why was it a waste of time to have a number of gardens in different parts of the bush?
4. Why did farmers plant different crops each year in their fields which were not fallow?
5. What did wise farmers try to find out about their fields and crops?
6. Why is it unwise to leave fields bare in the Tropics?

CHAPTER 6

CROWDED COUNTRIES WHERE GARDENS CANNOT REST

As men got more knowledge and learned how to make better tools and weapons, their numbers grew. Each man could no longer have several gardens and let some of them rest. Each man could not have even one garden big enough to leave part of it fallow. This happened many years ago in Europe and even earlier in India, China and Japan. In these countries the land must be used every year. So much food is wanted for all the millions of people that no land can be rested for several years or even left fallow for one year.

In most countries now the number of people is growing bigger. Each year there are more births than deaths. In the Tropics fewer babies die and fewer grown-up people die of disease and wounds. More people want land on which to grow their food. In some countries the people do not get enough to eat all the time. In parts of Africa and the Pacific Islands there are already so many people that each can no longer have enough land to be able to rest part of it for a number of years.

Now too they not only want enough food to eat, but also to be able to sell part of their crops for money to buy things to make life better or more comfortable. In many places people are trying to get bigger crops from their land, which they do not rest as they did before. Because of this they are harming the soil and the crops are getting smaller instead of bigger. They must find a better way of farming so that they can get bigger crops from the same amount of land.

There is enough good land in the world to grow enough food for everyone, but, as the number of people in the world grows, farmers must learn to make better use of the land. They must learn to take better care of the soil so that they can use the same field year after year without the crops getting smaller. They must learn better ways of farming. If there is enough land they can go back to the old way of resting part of it. If there is not enough land for that, they must find a new way of farming. What are new ways in some parts of the Tropics are not new ways in other parts or in Europe and North America. Wise farmers will learn from these countries or from men who have studied farming in them. Foolish farmers will laugh at new ways and go on harming their soil until it has lost all its fertility.

QUESTIONS

1. Write down the new words in this chapter and learn them.
2. Why had men in some countries to stop resting some of their gardens?
3. Name two countries in which men had to do this.
4. Why is the number of people in most countries growing bigger?
5. Why do some of the people in parts of Africa and the Pacific Islands now want to grow more things than they require for themselves?
6. What must farmers do if they want bigger crops and cannot rest their land?

PART 2.

HOW BETTER WAYS OF FARMING HELPED

CHAPTER 7

RESTING THE GARDENS

PLANTS take from the soil the foods that dissolve in water—the nitrogen foods, the phosphorous foods and the potash foods. If crops grow in the same garden for several years, they use up more and more of these foods. Microbes, sun, air and rain cannot change the plant food stored in the soil quickly enough into food which the plants can use. The store of plant food in the soil is smaller because the farmer takes away or burns the plants, and does not leave them to rot in the soil.

When the bush is allowed to grow over the land for a few years, the soil becomes covered with plants. It is not open to sun, wind and rain. When the plants die or drop their leaves, they fall on the soil and rot there. As they rot they give back not only the food they took from the soil; they also put into it the foods they made with the help of their green leaves, the air and the sunshine.

In countries where some of the fields were left fallow each year, the store food continued to be changed into food which plants could use. If crops were not sown and weeds were not allowed to grow, this food was not used that year. It remained in the soil ready to be used in the following years. So the fallow helped the crops which were planted after it.

QUESTIONS

1. Write down the new words in this chapter and learn them.
2. Name three foods which the plants take from the soil.
3. Name four things which help to change food stored in the soil into food which the plants can use.
4. Explain the two ways in which land can be rested.
5. How does each help the soil?

CHAPTER 8

MIXED CROPS

MEN began many years ago to plant more than one crop in the same garden at the same time. They found that doing so helped both the plants and the soil, though perhaps they did not know why. The reasons were:—

1. The different crops took different foods, or different amounts of the same foods from the soil.
2. Some crops had long roots and some had short roots, so they took their food from different layers of soil. The food which the plants used did

not all come from one layer of soil, so none of the layers lost as much as it would have with only one crop.

3. Some crops grew quickly and others grew slowly, so they were ready at different times. In this way the soil was covered most of the time and was not left open to the sun and rain for very long.

4. Harmful insects and plant diseases did not spread so quickly in plants of different kinds as they would have in plants of the same kind.

One great difficulty about mixed crops was that in collecting the harvest from one crop, it was not easy to avoid damaging the other crop. This was sure to happen if the plants were close together. If the plants were far enough apart to make harvesting easy, the harvest might be small and the soil might not be properly covered.

When farmers began to understand how important it is to plough or dig the soil, they found other difficulties about mixed crops. When they had gathered one crop, there was still another one left there. They could not begin to plough or dig for the next planting. They found they could not prepare the soil properly before they planted again. They stopped mixing their crops because they found that feeding, digging and draining the soil was a better way of farming.

QUESTIONS

1. Write down the new words in this chapter and learn them.

2. Name two ways in which mixed crops help the soil and the crops.
3. What difficulties did the farmer have when he mixed his crops?
4. What might happen if the plants were far enough apart to make harvesting easy?
5. Why did wise farmers stop mixing their crops?

CHAPTER 9

CHANGING THE CROPS

WHEN we keep on doing one thing for a long time our bodies become stiff and tired. If we read all day, our eyes become tired. If we write for a long time, our arms become tired. If we hoe, or run, or swim for a long time, we grow tired. This is true of everything we do. We like to change whatever we have been doing, and do something else. This rests the part of the body which we have been using most, and allows it to get back its strength again. Then we can go back to the work we were doing or the game we were playing before.

The soil is rather like this. When we change the crops which we grow on a garden, we ask the soil to use a different part of its "body". The second crop takes different foods from the soil, or takes more of some and less of others. If the soil is good, the plant foods not being used or being used less go on increasing as the foods stored in the soil are changed into food the plants can use. In this way we rest the part of the soil that was being used most, and let it get back its strength again.

If we keep on planting one crop on a garden, the food which that crop needs gets less and less. The food which it does not need keeps on increasing. We must not keep on planting one crop until the soil becomes tired and hungry for the kind of food which that crop uses.

If we change the crops, each plant food is used in turn. The soil does not get hungry for one kind of plant food. Wise farmers, in many countries, have learnt that it is not good to plant the same crop again and again on the same garden. They have learnt which crops grow best on their soil and which crop it is best to plant next. They know in which order to plant their crops every year so that they get the best harvests. Planting different crops in order like this is called rotation of crops.

QUESTIONS

1. Write down the new words in this chapter and learn them.
2. What does rotation of crops mean?
3. Why is it bad for the soil if we keep on planting the same crop year after year on the same garden?
4. Why is it good for the soil of a garden if we plant a different crop each year?
5. Do farmers where you live plant their crops in rotation? Write out a list of the crops they plant, and the order in which they plant them.

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CHAPTER 10

CHANGING THE CROPS—AN EXPERIMENT

AN experiment is something we do in order to see what happens.

Some farmers were slow to believe that planting crops in rotation was better than planting the same crop again and again in a garden. The wise farmers wanted to show them that rotation was the best way. In order to do so they carried out this experiment.

They chose three gardens with the same kind of soil, and numbered them. In Garden 1 they planted maize. In Garden 2 they planted maize, peas, beans and potatoes, all mixed up together. They divided Garden 3 into three strips. On strip A they planted peas and beans in straight lines. On strip B they planted maize in lines, and on strip C they planted potatoes in lines.

For several years they planted the same crops, in the same way, in Gardens 1 and 2. In Garden 3 they changed the crops on the three strips each year. They planted the crops in this rotation:—

	Strip A	*Strip B*	*Strip C*
1st Year	Peas and beans	Maize	Potatoes
2nd Year	Potatoes	Peas and beans	Maize
3rd Year	Maize	Potatoes	Peas and beans

Each year they weighed the harvest from each garden and from each strip in Garden 3. They found that the harvest from Garden 1 became smaller each year. They found that the harvests of maize, peas, beans and potatoes from Garden 2 became smaller each year, though not so quickly as the maize harvests from Garden 1.

They found that the harvest from each strip in Garden 3 was greater and better than any of the harvests from Gardens 1 and 2. Because Garden 3 had been planted in straight lines, the plants all grew well and the crops were easier to harvest. There was no disease and there were few harmful insects in the crops.

By this experiment the wise farmers showed the foolish farmers that rotation of crops gave better harvests than growing the same crop year after year in a garden, and better harvests than mixed crops.

QUESTIONS

1. Write down the new words in this chapter and learn them.
2. What is an experiment?
3. Why did the wise farmers carry out the experiment with the three gardens?
4. How often did they plant maize in Garden 1?
5. What crops did they plant in Garden 2 and how did they plant them?
6. Explain how they planted Garden 3?
7. Write out the rotation of crops on the three strips in Garden 3.
8. Which garden gave the best harvests?
9. What did the experiment show?

CHAPTER 11

TILLING THE SOIL

TILLING means digging. It is a very old way of helping the soil. In Genesis iv. 2 we read that Cain was a tiller of the soil. In Proverbs xxviii. 19 we read, "He that tilleth his land shall have plenty of bread." Hoes and ploughs are very old gardening tools. (See Book 1 of this series, *The First Farmers*.) The people in China, India and Egypt hoed and ploughed the soil hundreds of years ago.

These people did not know how tilling helped the soil, but they did it because they saw that the crops were better on soil that had been tilled. We now know the reason. Men, animals and plants all need air. They all breathe, and they all need fresh air. If we put a rat in a tin and shut the lid, the rat will live for a time and then it will die. It will have air at first, but will soon use it up. Unless it gets new, fresh air it will die. Book 2, *The Farmer's Soil*, chap. 2 tells you how animals and plants breathe.

All parts of a plant breathe. Leaves and stems get air easily, but the roots are covered with soil. They can get air only from the little spaces between the particles of soil. As the plants use the air between the particles, it must be replaced. New air must always be moving between the particles to take the place of the used air. This movement of air in the soil or in a room is called ventilation.

In Book 3, *The Farmer's Friends in the Soil*, chap. 7 we learned that the microbes, which live in the soil and help to make the plant food, also need air. If they do not get it, they do not multiply quickly and the plants do not get enough food.

When we dig the soil and turn it over with a hoe or a spade or a plough, we let new air in between the soil particles. We help to ventilate the soil. Top-soil that is not dug gets hard and smooth. When it is dug it is soft and rough. When we walk over newly dug soil, our feet sink into it. Digging has opened the soil and the particles are not so close together. There is more air between the particles, and it is new air.

Heavy rain presses down the soil. Hot sunshine makes clay soil hard and sandy soil loose. Hot sunshine after rain forms a dry hot skin or crust on top of the soil. The crust stops new air from getting into the soil, and even rain water flows over it instead of sinking in. When we dig we break up the crust, and air gets in again. We make new paths through which the rain can go down into the soil.

When we turn the soil over, we bring soil from below up to the top. Here the food stored in the soil changes more quickly into plant food, because it gets more air, more water and more warmth from the sun.

Tilling the soil helps it in all these ways. It also gives the soil a better and more even texture. (See Book 1, chap. 18.)

QUESTIONS

1. Write down the new words in this chapter and learn them.
2. What does tilling mean?
3. Name two countries where, long ago, the people tilled the soil.
4. How does tilling the soil help to ventilate it?
5. When does a hard crust form on top of the soil?
6. What harm does this crust do?
7. How does tilling the soil help the rain to get into it?
8. How does digging help to make plant food more quickly?

CHAPTER 12.

TILLING THE SOIL—A STORY

THERE was once a farmer who had always worked very hard. Although he had a number of big gardens, he always tilled the soil well and got very good crops. He had three sons who were all lazy and did not like digging in the gardens.

When he was dying, the old farmer called his three sons to him and said, "My gardens will now be yours. Do not scorn them, for there is a treasure hidden there. Look for the treasure, for, when you find it, you will have great happiness."

When their father was dead, the three sons looked for the treasure. They thought it would be a box full of money buried in one of the gardens. First they dug one garden, but, although they dug carefully, they did not find the treasure. Each time a hoe hit a stone, they thought they had found the box. To make sure they dug out the stone, but they did not find the box they thought was there.

When they were sure that there was no box of treasure in the first garden, one of the sons said, "We shall need food soon, and we have finished searching for the treasure in this garden. Let us plant food so that we shall have something to eat while we search the others." They planted that garden, and went on to the second one to dig for the treasure. When they did not find it there, they planted that garden also.

At last they had dug all the gardens and had not found any box of treasure. They were very angry, for they thought their father had deceived them. By this time, the first garden was ready for harvest. When they gathered it in, they found that the harvest was very big. They could not eat all the food themselves, so they sold some of it to other people. When the harvest in the second garden was ready, they found the same thing.

The eldest brother, who had not really believed that their father would deceive them, thought about this. At last he said to the others, "We were wrong in saying that our father deceived us. The good crops are the treasure which we have got by digging the gardens. We have other treasures also. When we were working hard in the gardens, we were happy because we had something to do and because we were helping each other. Our bodies are strong because we have worked hard and have had good food to eat. From our crops we have even got enough money to buy other things we want. This is what our father wanted us to learn. He has shown us the way to health and happiness as well as riches, three treasures instead of one."

QUESTIONS

1. Write down the new words in this chapter and learn them.
2. Why did the sons get such good harvests from the gardens?
3. What treasure did they think their father had left in the gardens?
4. What treasure did he want them to find?
5. What other treasures did they find?

CHAPTER 13

FEEDING THE SOIL—MANURES

EARLIER in this book we read how the farmers began to help their soil, as they would help their own tired bodies. They changed the work the soil had to do by rotation of crops. They helped to get more food and water for the plants by tilling the soil. They rested the soil by leaving it fallow.

So far they were not yet feeding the soil. By tilling it they were only helping the plant food stored in the soil to change more quickly into food the plants could use.

We have read in these books that trees take much food from the soil and that they put much back. The farmer's crops also take much food from the soil, so they too must put it back. Putting food into the soil is called manuring, and the food the farmer gives it is called manure. Wise farmers till their soil, put in manure and change their crops.

A manure is anything we put on or in the soil to help to make plant food. Some manures are ready for the plant to use; they dissolve in water. Other manures are not ready; they have still to be changed into plant food.

There are four kinds of manures:

1. Parts of plants, called rubbish, which rot and become humus.
2. Plants, often legumes, buried in the soil when they are young and green. These are called green manures.
3. Artificial manures, which are taken from the rocks, or are made, by man.
4. Animal waste, which is called farm manure.

QUESTIONS

1. Write down the new words in this chapter and learn them.

2. Give the meanings of the words rotation, tilling, fallowing, manuring.

3. How do we help our bodies when they are tired?

4. What should the farmer do to help his soil?

5. Write down the names of the four kinds of manure.

PART 3. FROM RUBBISH TO HUMUS

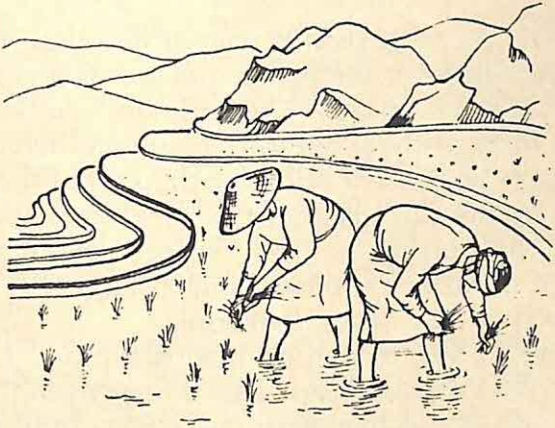
CHAPTER 14

HOW CHINA HAS FED HER MANY MILLION PEOPLE

FOUR thousand years ago, when Abraham left Ur to go to Canaan and the people in Britain were still River Men, the Chinese lived in towns and villages. They had good schools and many of them could read and write. Most of them were farmers, for there were many people in China even then, and they all had to be fed. They had to learn how to become good farmers.

There are four hundred million people in China now, more than in any other country in the world. For thousands of years the Chinese farmers have had to grow food year after year on the same gardens for these many millions of people. If the farmers had not learnt how to take care of the soil and to keep it fertile, they would all have starved long ago.

How did the Chinese farmers keep their soil fertile? Long ago they learnt that digging, planting peas and beans and changing the crops helped the soil. They learnt more than this. They found that dead leaves and stems made food for the new plants, so they wasted nothing. They buried in the gardens the dead leaves and stems and all the waste from cooking. With the help of microbes, these things rotted in the soil and became food for the next crops. The Chinese farmers learnt that they could get good crops year after year from the same gardens if they fed the soil.



PLANTING HILL PADDY

QUESTIONS

1. Write down the new words in this chapter and learn them.
2. What do you know about the River Men? (Book 1, *The First Farmers*, chap. 5)
3. How did the Chinese live four thousand years ago?
4. How many people are there in China now? Say the answer, then write it in figures. (This is a very big number, which is difficult to understand. Ask someone to explain it to you if you do not understand).
5. How did the Chinese keep their soil fertile? What did they use and what did they do with it?

CHAPTER 15

EASY WAYS OF MAKING HUMUS

WHEN they have harvested their crops, many farmers now cut down the plants and weeds and leave them to rot on the soil. They do not burn them or throw them away at the side of the garden. The farmers cannot eat or sell these things, but they are of use to the soil. As the dead leaves of the tree rot on the soil in the bush, so the garden waste rots on the farmer's soil and puts back into it some of the food the crops took out.

A better way of getting humus for the garden is to make a rubbish heap. This is made with weeds, garden waste, kitchen waste, sweepings from paths and houses, together with wood-ash and some soil. Only hard stems and roots that might grow again should not be used.

Under a tree make a pit about 4 yards long, 1 yard wide and ½ yard deep. Having collected rubbish from the garden and house, cover half the bottom of the pit with a layer about 6 inches deep. Press the rubbish down with the feet, then cover it with a layer of soil. Next put a thin layer of wood-ash on top of the soil. Keep on adding layers of rubbish, soil and ash, one after the other, until the heap is 3 or 4 feet high. (The pit is made long and narrow because it is easier to work with this kind than with a wide one. The tree shelters the heap from the sun and rain, which could harm the humus.)

The heap must be kept damp and, if there is not enough rain or dew to do so, water must be carried to it. Make a little hole in the middle of the top of the heap; pour the water in slowly and do not make the heap too wet. The microbes, which live in the rubbish and make it rot, are living creatures, and they must have water. The heap of rubbish will not rot properly without it. It is also good to turn the heap over every two or three weeks. Doing this lets the air into the heap and helps it to rot more quickly. When the rubbish is rotting well, the heap will be hot inside and there will be no bad smell.

After three months the rubbish, soil and ash will no longer be separate. The rubbish will have rotted, and the whole heap will be dark-coloured humus. The humus can then be carried to the garden and a layer of it about 3 inches deep spread on top of the soil. Soil spread on top of the humus protects it from the sun and rain, and it is good to do this if there is time.

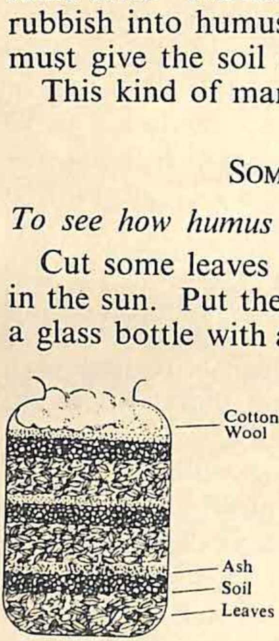
When one rubbish heap has been made, and we are waiting for it to rot, we should begin to build a second heap in the other half of the pit. If there is not much rubbish, the first heap will have rotted and have been carried to the garden, before we are ready to build a third heap. The third one can then be put where the first one was. If there is so much rubbish that we cannot do this, we must dig another pit and build the third heap in that. Perhaps we shall have several heaps all rotting at the same time. The important thing is to turn all the rubbish into humus and to waste none of it. We must give the soil all the help we can.

This kind of manure is usually called compost.

SOMETHING TO DO

To see how humus is made.

Cut some leaves into little pieces and dry them in the sun. Put them in the bottom of a glass, or a glass bottle with a wide mouth, to make a layer 2 inches deep. Put 1 inch of soil on top of the pieces of leaf. Put a thin layer of ash over the soil. Fill the glass or bottle with layers of cut leaves, soil and ash of the same depth and in the same order as before. Pour in a little water to make every part wet, then cover the top layer with cotton-wool to keep the water from evaporating too quickly. Pour in a little more water from time to time to keep the layers damp. If you look at the glass every day, you will see the leaves etc. slowly change colour. The colour will change from pale brown to dark brown and then to black. While these changes are going on the bottle will feel warm to the touch. At last all the layers will be black and you will find that everything in the glass has changed to humus.



QUESTIONS

1. Write down the new words in this chapter and learn them.
2. Why is it better to let dead plants rot on the soil than to burn them or throw them away at the side of the garden?
3. What rubbish should you collect to make a compost heap?
4. What parts of plants should not be used?
5. Why has the heap to be kept damp?
6. Why should it be turned over every 2 or 3 weeks?
7. What does the rubbish change into?
8. What is the name usually given to this kind of manure?

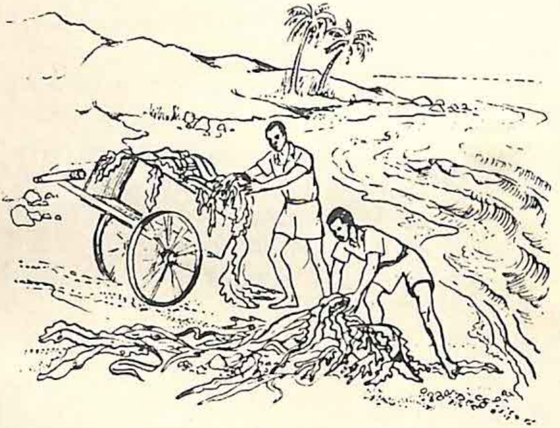
CHAPTER 16

ABOUT SEAWEED AND BURYING COMPOST

Seaweed.

If you live near the sea, you may be able to get seaweed, which is one of the best manures we can use. It contains nitrates, phosphates, potash and lime. It can be collected from the shore and carried to the gardens, but, if there is a river near, it should first be washed. Washing it in fresh water takes away the salt, too much of which is not good for the crops. The seaweed should be spread on top of the soil and left for a day or two to dry.

It should then be covered with soil. If we want to help plants like tomatoes, we can bury some of the seaweed about six inches deep all round the stem and 6 to 8 inches away from it.



GATHERING SEAWEED

Burying the Compost.

When parts of plants and other rubbish rot on the bare soil, they make a cover over it, as the fallen leaves do in the bush. In this way the soil is protected from the hot sun and the heavy rain, but some of the food in the rotting plants goes into the air and is lost. It is better to bury rubbish and compost in the soil. When this is done they rot more quickly, and no plant food is lost.

When we bury the compost we are also digging or tilling the soil, and so we are doing two good things at the same time.

QUESTIONS

1. Write down the new words in this chapter and learn them.
2. Why is seaweed such a good manure?
3. Why should the seaweed be washed in fresh water?
4. Why should dead plants and other rubbish be buried in the soil?
5. What other good thing do we do when we bury rubbish in the soil?

CHAPTER 17

HOW RUBBISH HELPED SOME AMERICAN FARMERS

SOME years ago a man, whose name was George Washington Carver, went to live in Alabama, one of the American States. He saw that the soil in the district was very poor. He found that it was unfertile because it had very little humus in it. He bought some land and said that he would grow good crops on it by improving the soil. When people heard this they laughed at him. The farmers in the district knew that the soil was poor and thought that nothing could be done to make it better.

Near the land which George Carver bought there were many trees and some rivers. For many years dead leaves had been falling and rotting under the trees. Near the rivers there were swamps with rotting plants in them. George Carver got some people to help him to collect rubbish, dead leaves, half rotted plants and mud from under the trees and from the swamps and river beds. They filled baskets and buckets with these things, took them back to the gardens and spread them on top of the poor soil. Then they covered them over with more soil.

GEORGE CARVER

George Carver then planted ground-nuts and potatoes. His crops were better than those planted on land near his, and the other farmers were astonished. Many of them came to see his crops and his harvests, for they knew that his soil had been as bad as theirs. When they saw the result of burying rubbish in George Carver's garden, they went home and began to collect rubbish to bury in their own gardens.

In order to teach people farther away how to take care of their soil, George Carver bought a motor car. In this he travelled round the country, taking with him baskets of rubbish and dead leaves. He also took with him baskets of groundnuts and potatoes to show the farmers the good harvests he had got. He told them about humus and about the work of microbes in the soil. The wise farmers began to collect rubbish, and to bury it in their soil to make humus.

In this district of Alabama the soil has now become fertile. The farmers, who were so poor when George Carver went there, can now give their children enough food to eat and enough clothes to wear. They are much happier and healthier, and never stop thanking George Carver for teaching them this better way of farming.

1. Write down the new words in this chapter and learn them.
2. In what country is Alabama?
3. Why was the soil there unfertile?
4. Where did George Carver collect the rubbish?
5. What crops did he plant after he had buried the rubbish in his garden?
6. What did he take with him in his car?
7. Why have the farmers and their children become healthier and happier?

These are some of the new words in this book:

1. fallow; rotation; treasure; weeds; experiment.
2. travel; ventilation; field; tilling; crust.
3. creeper; stiff; increases; deceive; seaweed.

Complete these sentences by using words from line 1.

1. Each year the farmer left one part of his garden unplanted. This was called . . . . land.

2. Hoeing lets the air into the soil and gets rid of the . . . .

3. Planting different crops each year in a certain order is called . . . . of crops.

4. The farmer's sons thought that their father had buried a box of . . . . in the garden.

5. Something we do in order to see what will happen is called an . . . .

Complete these sentences by using words from line 2.

6. George Carver used to . . . . round in his motor car teaching the farmers.

7. . . . . the soil is another name for digging it.

8. The hot sun after rain makes a hard . . . . form on top of the soil.

9. In Europe the farmers used to let one of their . . . . lie fallow each year.

10. When fresh air does not get into a room and used air does not get out, we say there is no . . . . in the room.

Complete these sentences by using words from line 3.

11. When we do the same kind of work for a long time, our bodies become tired and . . . .

12. . . . . is one of the best manures we can use.

13. A plant which climbs up trees is called a . . . .

14. The number of people in the world . . . . every year.

15. The farmer's eldest son did not believe that their father wished to . . . . them.

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